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DISCOVERIES AND IMPROVEMENTS, IN ARTS, MANUFACTURES, AND AGRICULTURE.

A concise View of the Theory respecting Vegetation, lately advanced in the Philosophical Transactions, illustrated in the Culture of the Melon ; by Thomas Andrew Knight, Esq. F.R.S, &c.

THE Council of the Horticultural Society having desired that I would send them a general view of my theory on vegetable physiology, which has been published by the Royal Society, I have great pleasure in obeying their wishes ; and conceiving that I shall be able to render it more clear and useful, by making it illustrative of the proper culture of some particular plant, and by referring the reader to the papers in the Philosophical Transactions for evidence in support of the circumstances stated, I have for this purpose chosen the Melon.

A seed, exclusive of its seed-coats, consists of one or more cotyledons, a plumule or bud, and the caudex or stem of the future plant, which has generally, though erroneously, been called its radicle. In these organs, but principally in the cotyledons, is deposited as much of the concrete sap of the parent plant, as is sufficient to feed its offspring, till that has attached itself to the soil, and become capable of absorbing and assimilating new matter.

The plumule differs from the buds of the parent plant in possessing a new and independent life, and thence in assuming, in its subsequent growth, different habits from those of the parent plant. The organizable matter which is given by the parent to the offspring in this case, probably exists in the cotyledon of the seed, in the same state as it exists in the alburnum of trees ; and like that, it apparently undergoes considerable changes before it becomes the true circulating fluid of the plant: in some it becomes a saccharine, in others acrid and bitter, during germination. In this process the vital fluid is drawn from the cotyledons in the caudex of the plumule or bud, through vessels which correspond with those of the bark of the future tree, and are indeed perfect cortical vessels From the point of the caudex springs the first root, which, at this period consists wholly of bark and medulla, without any alburnous or woody matter ; and, if uninterrupted by any opposing body, it descends in a straight line towards the centre of the earth, in whatever position the seed has been placed, provided it has been permitted to vegetate at rest.

Soon after the first root has been emitted, the caudex elongates, and taking a direction diametrically opposite to that of the root, it raises, in a great many kinds of plants, the cotyledons out of the soil, which then becomes the seminal leaves of the young plant. During this period the young plant derives nutriment almost wholly from the cotyledons or seed-leaves, and if those be destroyed, it perishes. Gravitation by operating on bodies differently organized, and of different modes of growth, appears at once the cause why, in the preceding case, the root descends, and why the elongated plumule ascends.

The bark of the root now begins to execute its office of depositing alburnous or woody matter ; and as soon as this is formed, the sap, which had hitherto descended only through the cortical vessels, begins to ascend, through the alburnum. The plumule in consequence elongates, its leaves enlarge and unfold, and a set of vessels, which did not exist in the root, are now brought into action. These, which I have called the central vessels, surround the medulla, and, between it and the bark, form a circle upon which the alburnum is deposited, by the bark, in the form of wedges, or like the stones of an arch. Through these vessels, which diverge into the leaf stalks, the sap ascends, and is dispersed through the vessels, and parenchymatous substance of the leaf; and in this organ the fluid recently absorbed from the soil, becomes converted into the true sap or blood of the plant; and as this fluid, during germination, descended from the cotyledons and seed-leaves of the plant, it now descends from its proper leaves, and adds, in its descent, to the bulk of the stem, and the growth of the roots. Alburnum is also deposited in the stem of the plant, below the proper leaves, as it was previously deposited below the seed-leaves, and from this spring other central vessels, which give existence to, and feed other leaves and buds.

A considerable part of the ascending fluid must necessarily have been recently absorbed from the soil: but in the alburnum it becomes mixed with the true sap of the plant, a portion of which, during its descent down the bark, appears to secrete into the alburnum, through passages correspondent to the anastomosing vessels of the animal economy. For as the cotyledons, or seed-leaves, first afforded the organizable matter which composed the first proper leaves, so these, when full grown, prepare the fluid which generates other young leaves, the health and growth of which are as much dependent on the older leaves, as those, when first formed, were upon the cotyledons.

The power of each proper leaf to generate sap, in any given species and variety of plant, appears to be in the compound ratio of its width, its thickness, and the exposure of its upper surface to light, in proper temperature. As the growth of the plant proceeds, the number and width of the mature leaves encreases rapidly, in proportion to the number of young leaves to be formed; and the creation consequently exceeds the expenditure of true sap. This therefore accumulates during a succession of weeks, or months, or years, according to the natural habits and duration of the plant, and varying considerably according to the soil and climate in which each individual grows: and the sap thus generated is deposited in the bulb of the Tulip, in the tuber of the Potatoe, in the fibrous roots of Grasses, and in the alburnum of trees, during winter, and is dispersed through their foliage and bark during the spring and summer.

As soon as the plant has attained its age of puberty, a portion of its sap is expended in the production of blossoms and fruit. These originate from, and are fed by central vessels, apparently similar to those of the succulent annual shoot and leaf stalk, and which probably convey a similar fluid; for a bunch of grapes grew and ripened, when grafted upon a leaf stalk; and a succulent young shoot of the Vine, under the same circumstances, acquired a growth of many feet.

The fruit, or seed vessel, appears to be generated wholly by the prepared sap of the plant, and its chief office to be that of adapting the fluids, which ascend into it, to afford proper nutriment to the seeds it contains. I proceed to offer some observations upon the proper culture of the Melon.

There is not, I believe, any species of fruit at present cultivated in the gardens of this country, which so rarely acquires the greatest degree of perfection, of which it is capable of acquiring in our climate, as the Melon. It is generally found so defective both in richness and flavour, that it ill repays the expense and trouble of its culture; and my own gardener, though not defective in skill or attention, had generally so little success, that I had given him orders not to plant Melons again. Attending, however, after my orders were given, more closely to his mode of culture, and to that of other gardeners in my neighbourhood, I thought I saw sufficient cause for the want of flavour in the fruit, in the want of efficient foliage; and appealing to experiment, I have had ample reason to think my opinions well founded.

The leaves of the Melon, as of every other plant, naturally arrange themselves so as to present, with the utmost advantage, their upper surfaces to the light; and, if, by any means, the position of the plant is changed, the leaves, as long as they are young and vigorous, make efforts to regain their proper position But the extended branches of the Melon plant, particularly under glass, are slender and feeble; its leaves are broad and heavy; and its leaf stalks long; so that if the leaves be once removed, either by the weight of water from the watering-pot, the hand of the gardener in pruning, in eradicating weeds, or any other cause, from their proper position, they never regain it; and in consequence, a large portion of that foliage, which preceded, or was formed at the same period with the blossoms, and which nature intended to generate sap to feed the fruit, becomes diseased and sickly, and consequently out of office, before the fruit acquires maturity.

To remedy this defect, I placed my plants at greater distances from each other than my gardener had previously done, putting a single plant under each light, the glass of which was six feet long by four wide. The beds were formed of a sufficient depth of rich mould to ensure the vigorous growth of the plant; and the mould was, as usual, covered with brick tiles, over which the branches were conducted in every direction, so as to present the largest possible width of foliage to the light. Many small hooked pegs, such as the slender branches of the beech, the birch, and hazel, readily afford, had been previously provided; and by these, which passed into the mould of the bed, between the tiles, the branches of the plants were secured from being disturbed from their first position.[*] The leaves were also held erect, and at an equal distance from the glass, and enabled, if slightly moved from their proper position, to regain it.

I, however, still found that the leaves sustained great injury from the weight of the water falling from the watering pot; and I therefore ordered the water to be poured from a vessel of a proper construction, upon the brick tiles, between the leaves, without at all touching them; and thus managed, I had the pleasure to see that the foliage remained erect and healthy. The fruit also grew with very extraordinary rapidity, ripened in an unusually short time, and acquired a degree of perfection, which I had never previously seen.

As soon as a sufficient quantity of fruit (between twenty and thirty pounds) on each plant is set, I would recommend the further production of foliage to be prevented, by pinching off the lateral shoots as soon as produced, wherever more foliage cannot be exposed to the light. No part of the full grown leaves should ever be destroyed before the fruit is gathered, unless they injure each other, by being too much crowded together; for each leaf, when full grown, however distant from the fruit, and growing on a distinct branch of the plant, still contributes to its support; and hence it arises, that when a plant has as great a number of growing fruit upon part of its branches, as it is capable of feeding, the blossoms upon other branches, which extend in an opposite direction, prove abortive.

The variety of Melon, which I exclusively cultivate, is little known in this country, and was imported from Salonica, by Mr. J. Hawkins, Its form is nearly spherical, when the fruit is most perfect, and without any depressions upon its surface: its colour approaching to that of gold, and its flesh perfectly white. It requires a much greater state of maturity than any other variety of its species, and continues to improve in flavour and richness, till it becomes externally soft, and betrays some symptoms of incipient decay. The consistence of its flesh is then nearly that of a water melon, and it is so sweet, that few will think it improved by the addition of sugar. The weight of a good Melon of this variety is about seven pounds. I send some seeds of it to be distributed amongst such members of the Horticultural Society, as may wish to receive them.

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